

[Detailed Description of the Invention]

[0001]

[Field of the Invention] this invention can measure easily the glucose for example, in blood, etc. and the specific component in a liquid sample by a small amount of still more detailed sample about quick and the biosensor which can carry out a quantum easily and correctly -- it is easy to use and is related with the electrode structure and its manufacture approach of a cheap biosensor.

[0002]

[Description of the Prior Art] Conventionally, in the quantum of the specific component in a sample solution, the biosensor which measures the abundance of the various quality of a device under test using the high molecule discernment capacity of living body related substances, such as an enzyme, is known. For example, the glucose sensor which carries out the quantum of the glucose is put in practical use as an enzyme sensor which used the enzyme as a living body related substance in it. An enzyme sensor fixes the enzyme which has high substrate specificity to the quality of a device under test in base materials, such as a poly membrane, contacts the quality of a device under test in a sample to an enzyme, can detect electrochemically the matter produced by the enzyme reaction, and can carry out a quantum.

[0003] It went in every direction over the application of a biosensor, for example, in the case of the aforementioned glucose sensor, it has turned quotient business by blood sugar level management of a diabetic, production control of food processing, etc. Moreover, various utilization also of the biosensor (microbial sensor) using a microorganism is carried out, and it is used for the water quality analysis of a river, safety management of industrial liquid waste, etc. Thus, the biosensor is broadly put in practical use by medicine, food analysis, fermentation management, environmental measurement, etc. in the quantum of the specific component in a sample solution. And measurement of the time of utilization was not like [which is used in facilities, such as a hospital and works, in many cases, and cannot approve according to the outstanding molecule discernment capacity], although there was also a problem that equipment was large-sized and time amount and costs started. However, in order that especially an individual might investigate the check of health, a sick condition, and the effectiveness of a therapy, when the specific component in blood or urine was measured, for the running cost or difficult operating instructions, it became a big burden and the user was expected the cheap sensor which can be measured on that spot in simple.

[0004] For example, it enables it to measure the biosensor which can be used as a glucose sensor proposed by JP,6-76984,B for a short time only by the sample solution of a minute amount being dropped from a top. In this number official report, the biosensor of the structure which installed the measurement chip which put the liquid retaining layer of rayon paper, the filter layer of porous membrane, and the reaction layer of the nonwoven

fabric in which the enzyme was included into the annular frame in the polar zone to which the platinum electrode embedded at the cylinder base material made of resin was exposed from the raised bottom side is proposed. However, however structure may be complicated, there may be many production processes and component parts and it may devise, it will not be avoided that cost becomes high. Moreover, JP,6-58338,B has proposed what considered the biosensor which can be used as a glucose sensor etc. as the disposable type. As the structure of this biosensor is shown in drawing 6 - drawing 8 , after carrying out printing formation of the electrode material on the other end of the lead which considers as the connection terminal 923 using the end of the lead which carried out printing formation by conductive paste, and serves as an electrode at sheet 91a made of resin Print an insulating layer 94 to the appearance to which the connection terminal 923 and Electrodes 922 and 922a are exposed, and the remaining lead is covered. Furthermore, form the reaction layer 95 which fixed the enzyme on an electrode 922 and 922a, and it considers as a bottom substrate. The laminating of the sheet 91b which becomes covering through the spacer sheet 97 by which the space section 96 is made in this to around the reaction layer 95 is carried out. A sample solution goes into the space section by capillarity from the inlet 98 at a tip, and the gas of space circles is the structure extruded by installation of a sample solution from the exhaust port 99, and exchange with the sample solution of a minute amount and the gas of space circles is made to be performed smoothly.

[0005]

[Problem(s) to be Solved by the Invention] However, although a biosensor which was proposed by above-mentioned JP,6-58338,B had become what is made disposable and makes individual use easy, it was not what unlike the case where the skilled analyst under exclusive contract uses it it is not necessarily easy to use when ordinary individuals are use. If it checks the front flesh side of an electrode and does not insert it in the body of a measuring device, it cannot be measured correctly. Furthermore, it is because there was a possibility that the adjoining connection terminals might flow electrically when it is adjacently prepared in the same field of the sheet with which two or more connection terminals serve as a substrate, the sample solution which measures actuation accidentally was made to adhere to somewhere else of a sensor and it wet a part for a connection terminal area. Moreover, the spacer sheet which carried out cutting etc. is needed for a predetermined configuration which forms the space section other than the sheet of two sheets as a component part, the room of an improvement is in structure, and it was not avoided that cost becomes high.

[0006]

[Means for Solving the Problem] Then, the biosensor of this invention is set to the biosensor which has the electrode system prepared on the insulating substrate and this substrate at least, and the reaction layer which faces the space section prepared between two insulating substrates. An electrode and its connection terminal were made to divide into two insulating substrates as structure where the connection terminal of both the insulation substrate was exposed to the table flesh-side reverse sense, respectively, as a

configuration which has a notch for exposing the connection terminal with which the insulating substrate which counters has the appearance configuration of two insulating substrates. Moreover, the space section which a reaction layer faces by adhesion and carrying out a laminating through a spacer in two insulating substrates was secured. Furthermore, the sheet-like spacer was made unnecessary at this spacer using what was formed in insulating substrate of at least one of the two of printing or partial spreading. [0007] And the appearance configuration of two insulating substrates was seen from the electrode forming face side, and was made structurally simple as the same configuration. Moreover, it also made it structurally simple to see one or more [in the electrode and connection terminal which constitute this electrode system, a lead, an insulating layer, etc.] from the electrode forming face side of an insulating substrate, and to make it into the same pattern configuration further also with the configuration of each electrode system of two insulating substrates. What is made into the same pattern configuration is considering as the lead connected to an electrode and a connection terminal, and also making an electrode, a connection terminal, and an insulating layer into the same pattern configuration further, and attained structural simplification.

[0008] Next, the manufacture approach of the biosensor of this invention is set to the manufacture approach of a biosensor of having the electrode system prepared on the insulating substrate and this substrate at least, and the reaction layer which faces the space section prepared between two insulating substrates. Two insulating substrates which have an electrode and a connection terminal on one side this biosensor A spacer is minded, and a laminating is pasted up and carried out so that it may leave the space section. The appearance configuration of these two insulating substrates It is what constitutes the configuration which has a notch for exposing the connection terminal which the insulating substrate which counters has. Before the process which forms an electrode system and a reaction layer in an insulating substrate, in process or the notch for exposing the connection terminal of the insulating substrate which counters, when insulating substrates are made to counter after a process and a laminating is carried out, Slitting is put into a boundary at least as the body part of the insulating substrate which left this notch. Subsequently By piling up two insulating substrates, and cutting both the insulation substrate in a predetermined sensor configuration with a spacer, after carrying out a laminating, adhesion and It considered as the approach that the biosensor of the structure where exposed the connection terminal of both the insulation substrate to the front flesh-side reverse sense by the above-mentioned notch, respectively, and an electrode and its connection terminal were made to divide into two insulating substrates can be manufactured easily.

[0009] Moreover, the configuration of the above-mentioned notch is made into a configuration from which the insulating substrate of both after cutting in a sensor configuration sees [configuration] from an electrode forming face side, and serves as the same configuration, and is manufactured.

[0010] Moreover, or more [in the lead and electrode which are connected to the electrode and connection terminal which constitute this electrode system about each electrode system of two insulating substrates, a connection terminal, and an insulating layer] about one, it sees from the electrode forming face side of an insulating substrate, and forms in the same pattern configuration. It is a lead at least and was taken as the manufacture approach which also forms a lead, an electrode, a connection terminal, and an insulating

layer in the same pattern configuration further.

[0011] Moreover, slitting put into the boundary of a notch was performed by the half cutting which leaves a part of thickness direction of an insulating substrate, two insulating substrates were piled up, and manufacture by multiple attachment was made easy by considering as the approach of separating an unnecessary notch behind, before carrying out full separation of the slitting by this half cutting, separating a notch and cutting in a sensor configuration after carrying out a laminating, adhesion and. Moreover, the spacer was formed in insulating substrate of at least one of the two by printing or partial spreading, the front stirrup of the formation process of a spacer was performed behind, and slitting of a notch and the body part of an insulating substrate put into a boundary at least made it the approach of manufacturing without using a sheet-like spacer.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation is explained about the biosensor and its manufacture approach of this invention, referring to a drawing. Drawing 1, drawing 2, and drawing 3 are drawings showing one example of the biosensor of this invention, and drawing 1 is [an external view and drawing 3 of the decomposition perspective view and drawing 2] sectional views. The biosensors 10 of this invention shown in these drawings are adhesion and the structure by which the laminating was carried out, as two insulating substrates 1a and 1b leave the space section 6 which the reaction layer 3 faces through a spacer 4, and as for both the insulation substrate in front of a laminating, they have the electrode system, and adhesion and the spacer 4 for carrying out a laminating in the inside side respectively. The electrode system of both substrates consists of the lead 21, an electrode 22, a connection terminal 23, and an insulating layer 5. As for lead 21, the end accomplishes the connection terminal 23 (making it serve a double purpose), as for the other end, an electrode 22 is formed on lead 21, and the exposure unnecessary section is covered by the insulating layer 5. Moreover, on the electrode 22 of lower insulating substrate 1a, the reaction layer 3 containing living body related substances, such as an enzyme, is formed, it becomes the operation pole 221, and the electrode of the substrate of another side is a counter electrode 222. What was formed in the insulating substrate as a straight-line-like pattern is used for both sides so that a spacer 4 may leave the space section 6, the inlet 61, and exhaust port 62 for contacting a reaction layer to a sample solution. Consequently, the inlet 61 which introduces a sample solution into a part for the side edge surface part of the side which does not have a connection terminal faces across and carries out opening of both the sides to a spacer, and the exhaust port 62 which discharges the gas of the space section to a part for the side edge surface part by the side of a connection terminal has structure which carried out opening. In addition, what is necessary is to carry out an exhaust port like exhaust port 62a which preparing in the interior of an insulating substrate is also one of the desirable modes, and shows it by the dotted line of drawing 2 in this case, and just to prepare it. In this case, the space section by the side of a connection terminal may be fill uped with a spacer from exhaust port 62a which consists of an inlet 61 a distant place side. It is effective in avoiding the sample solution attained to opening by the side of a connection terminal overflowing, and soaking a connection terminal in preparing exhaust

port 62a suddenly, even if the space section is carrying out opening continuously to the side edge side by the side of a connection terminal there.

[0013] And as shown in this drawing, the appearance configuration of two insulating substrates 1a and 1b is having notches 11a and 11b, and makes it possible to expose the connection terminal of both insulating substrates outside. Moreover, the appearance configuration of both the insulation substrate of having a notch respectively is seeing from the inside side which has an electrode system, and considering as the same configuration, and makes it possible to carry out common use of the cutting die with both substrates at the time of manufacture.

[0014] the biosensor of this invention have the description fundamental [that it consist of two insulating substrates , and it should dissociate and the electrode forming face should prepare electrode a system (for example , an operation pole and a counter electrode) in both these two insulating substrates so that it be suitable and the inside (reaction chamber side) may be counter , they should moreover be make to expose the sense terminal of both the insulation substrate , and connection with the exterior should be make possible like ****] to the geometrical structure which prepared the notch in both the insulation substrate . Consequently, even if an unwilling part ***** to the conventional biosensor which prepared one of the two the electrode system with the insulating substrate of a two-sheet configuration, it will not flow in a connection terminal area, but the advantage of being easy to employ an unfamiliar individual will be acquired. Moreover, it sets in the configuration whose reaction layer does not prepare a reaction layer in the electrode of the insulating substrate of another side at the electrode of one of the two's insulating substrate. The electrode which prepared the reaction layer into the measurement algorithm which impresses potential to the electrode system of a biosensor by the body side of a measuring device incorporates which or the processing to judge. A mediator is received desirably. for example, the matter which is used for the reaction layer before impressing the potential for this measurement and which has activity electrochemically -- It applies to oxidation potential from just before the oxidation reduction potential of a proper which it has, potential is quickly used as one of electrodes impression and a sweep, and the increment of the response current is measured. If a remarkable increment is acquired, right potential will be judged to be what was impressed to the right electrode side. If it is made to impress the potential of the normal after decision to a right electrode immediately, after checking the side which has a connection terminal at every measurement, it will become unnecessary to insert in a measuring device, and will very become easy to use. In addition, it is also as one of the incorrect connection (operation pole and counter electrode) preventive measures at the time of setting a sensor in a measuring device for a notch configuration as the shape of an anomaly intentionally with both the insulation substrate. It is visual decision or it also becomes possible to recognize the shape of an anomaly structurally by the measuring device side. Moreover, if a notch configuration is seen from an electrode forming face side and made into the same configuration with both the insulation substrate, the common use of the cutting die for piercing an insulating substrate in a predetermined configuration in the manufacture approach can be carried out with vertical both substrates, and low cost-ization can be attained.

[0015] The pattern configuration of an electrode system can also share the printing version in the electrode series formation usually performed by screen-stencil by

considering as the same pattern configuration with both the insulation substrate, as shown in drawing 1 and drawing 2. Moreover, this is a manufacture process, and the merit which can be manufactured without distinguishing the insulating substrate of both upper and lower sides arises, and it leads to low cost-ization. an electrode system -- usually -- conductors, such as a lead, an electrode, and a connection terminal, -- although a part, an insulating layer, etc. are used as a component, if the same patterning of at least one of these is carried out, the cost merit of the part will be obtained -- carrying out, the same pattern, then (drawing 1 and example of drawing 2) its effectiveness become larger about all. Especially, it is easy to carry out the same patterning from that purpose, and coincidence formation also of the connection terminal is carried out with the same ingredient as a lead in many cases, and it can be considered in this case that a lead is a part of lead. In addition, although it is that there is a thing of the configuration as the location same on an insulating substrate as the same pattern configuration where the pattern configuration of an electrode system is the same, some which have the thing of the same configuration in the location where it shifted on the substrate have the advantage which can be communalized, and, as for the printing version, also include this semantics.

[0016] In addition, ingredients, such as an insulating substrate, an electrode system, a reaction layer, and a spacer, and those formation should just choose the thing suitable for an application from a well-known ingredient and an approach suitably conventionally. For example, the resin sheet which consists of polyethylene terephthalate (the following, PET) etc. is used for an insulating substrate. What is necessary is for a lead and a connection terminal to be the conductive pastes of metal content, such as silver metallurgy, and for an electrode to be carbon paste, and for an insulating layer to be an insulating paste and just to form it in an electrode system by screen-stencil respectively. If a reaction layer is used as a glucose sensor with an enzyme sensor, it will be formed by the layer which fixed glucose oxidase, then spreading it is good, and are screen-stencil of enzyme content ink, or according to the dispenser of coating liquid. Moreover, in addition to this, there may be a layer of controlling a permeate lump of for example, a specimen sample solution.

[0017] although a spacer may carry out adhesion immobilization of the insulating substrates with adhesives through a PET sheet using a PET sheet, use for one [at least] insulating substrate what form by printing (to pattern which form the space section), or partial spreading in the sheet which make into the predetermined configuration beforehand that the space section form require have an advantage in respect of components mark reduction and low cost-izing. printing or a part -- spreading -- what is necessary is just to choose the means forming of a spacer suitably with the ingredient to be used Although screen-stencil is suitable for printing at the point which can be formed thickly, the ingredient with this unsuitable printing is partially applied with applicators, such as hot melt, and the version configuration for spreading. Although manufacture is usually performed by multiple attachment, printings, such as the shape of the shape of a continuation stripe which stands in a row in an adjoining sensor, and an intermittent stripe discontinuous between adjoining sensors, then can also make spreading formation of an unsuitable ingredient comparatively easy. As a spacer ingredient by printing or partial spreading, hot melt adhesive, such as hot melt adhesives, such as hot melt mold binders, such as a heat activity heat-curing mold binder, or heat activity heat-curing mold

adhesives, etc. can be used, and for example, acrylic resin, a silicone elastomer, etc. are used as these resinous principles, for example. Moreover, additives, such as a bulking agent, are suitably added to the improvement in a printability, coating fitness, etc. And if the laminating of the two insulating substrates is carried out and a moderate pressure is applied heat and if needed, it is activated with heat, and the formed spacer pastes up both the insulation substrate and is fixed. Moreover, when it cannot form in the thickness of extent as for which between insulating substrates is made to desired spacing (it is usually about 50-300 micrometers that what is necessary is just spacing at which a part for the thickness of an electrode system can be held in the space section, and a sample solution is led and may be contacted to a reaction layer) in one printing or spreading of a binder or adhesives, printing or spreading of multiple times may be performed in piles. In this case, it may not consider as the same ingredient, but you may form so that the layer of the layer which takes charge of an adhesion function which takes charge of a thickness function may be pinched. In the layer which takes charge of a thickness function, the function which adhesive strength discovers with heat may be unnecessary, and the insulating paste in which the thick peak is possible may be [that what is necessary is just screen-stencil ink which can do the thick peak] used. In addition, when forming a spacer after the reaction stratification, even if the measurement interfering substance comes out from a spacer, you may cover by the protective layer so that a reaction layer can be protected. For example, in the case of the reaction layer containing glucose oxidase, the ink or coating liquid containing phospholipid is printed or applied.

[0018] In order to prepare a notch, since it is easy to damage the electrode system which counters, after both the insulation substrate laminating, it pierces and cuts off in the condition in front of a laminating, or half cutting is carried out and it cuts off behind a laminating. Although slitting may be put into the boundary line of a notch and an insulating substrate body and a notch may be separated completely, it considers as half cutting and both the insulation substrate may be detached behind a laminating. In addition, half cutting is good also as insulating substrate of one of the two. In half cutting, there is an advantage which can prevent being scattered while the dust of a notch manufactures. When forming a spacer in an electrode system, a reaction layer, and it by printing or partial spreading, the timing on the process which puts in slitting is good, if next any are sufficient and slitting does not cause trouble to these formation the middle before the formation process of these single strings including a spacer. For example, the one gestalt is after all formation. If (below-mentioned drawing 4) and slitting are made into the spacer formation back when a spacer is made into the shape of a continuation stripe which stands in a row in an adjoining sensor and it passes a notch by manufacture of multiple attachment, the unnecessary spacer formed in a notch can also be deleted. Under the present circumstances, if a spacer is formed in the direction of the insulating substrate of the side which counters, it will mean that the spacer was exposed with as near the connection terminal. However, such a thing will not break out, if spacer formation is discontinuity-sized also by the shape of same stripe (a notch is not formed). In addition, when forming a spacer in both the insulation substrate, the advantage of communalization is acquired with both substrates, such as the same configuration, then the printing version, also here.

[0019] Next, the manufacture approach of this invention of manufacturing the biosensor mentioned above is an approach of preparing the notch for connection terminal exposure

in one, and is to use this by manufacture by practical multiple attachment. Moreover, it is also the manufacture approach of forming a notch configuration, the pattern configuration of an electrode system, etc. in the same configuration with two insulating substrates, and also forming a spacer by printing or partial spreading, and using half cutting for formation of a notch. One gestalt of the manufacture approach is the production process shown in drawing 4, and the rectangle (a notch part disregarded) " drawing 4 " indicates this drawing to be with a broken line by abbreviation] etc. below drawing 4 (a) [supposing manufacture of multiple attachment means the appearance configuration of the insulating substrate of the part used as one sensor. In the production process shown in drawing 4, it is the case where spacer formation by the notch of the same configuration, the insulating (it is final) substrate of the same configuration, the electrode system (a lead, an electrode, a connection terminal, and insulating layer) of the same configuration, printing, or partial formation is performed. Moreover, a spacer is the case where it forms in both substrates in the same configuration.

[0020] first, the lead 21 which prepares the insulating substrate 1 and also makes (a) and the connection terminal 23 serve a double purpose -- forming -- (b) and (d) which subsequently forms an electrode 22, forms an insulating layer 5 in (c) and a degree, and forms an electrode system as a final electrode (exposure) configuration. So far, the insulating substrate of two upper and lower sides is treated in common. Next, the reaction layer 3 is formed on an electrode at one substrate (e). And a spacer 4 is formed in the substrate in which the reaction layer was formed (f-1), and a spacer 4 is formed also in the substrate of another side in the same configuration (f-2). a notch 11 is pierced and separated to these substrates (g-1) -- and (g-2) . In addition, when preparing an exhaust port, coincidence may be punctured at this process at substrate of one of the two. And heat and pressure are applied, and after adhesion / immobilization and a perimeter are pierced with a spacer, and it is made [the laminating of the insulating substrate of two upper and lower sides is carried out, and] the appearance configuration of a final sensor, and considers as one biosensor (h).

[0021] In addition, drawing 5 is the explanatory view in which extracting at the time of finally considering as the appearance configuration of a sensor, and showing a configuration 13 while showing one gestalt of the configuration of slitting put into the boundary lines 12a and 12b of a notch and an insulating substrate body, when preparing and manufacturing notches 11a and 11b by multiple attachment. In addition, this drawing extracts the 4th page part of every direction on explanation, and every notch is the quadrilateral configuration by which the four way type was surrounded in fact. In addition, in multiple attachment, a margin is usually prepared in the perimeter of each sensor configuration, and contiguity arrangement is carried out. Therefore, in the manufacture approach, it puts into a boundary at least as the configuration of a notch, a notch, and an insulating substrate body part, and cuts deeply, and semantics of ** is clarified also by relation with a margin. Slitting is extending and putting in to this margin part, and when piercing in a sensor configuration finally, even if it shifts somewhat, an appearance is connected finely and it can be cut. Similarly, when cutting a notch beforehand and deleting it, it considers as the form somewhat included to the margin. Therefore, the configuration after deleting a notch turns into a configuration also including some margins. The semantics with the same configuration means at least the configuration of the part which removed this margin fundamentally with both substrates

with the imagination configuration of a notch by the manufacture approach. Of course, as long as the slitting configuration within a margin is the same, a configuration also including a margin is sufficient.

[0022]

[Example] Next, one example explains this invention. The spacer configuration formed in the appearance configuration of an insulating substrate, the electrode system, and this substrate of the upper and lower sides which this example manufactures the biosensor of the configuration shown in drawing 4 and structure by multiple attachment, and have a notch is the same configuration. First, as an insulating substrate, it calcinates and a lead and a connection terminal are formed, it calcinates on the PET sheet of 250-micrometer thickness, an electrode is formed in it, it calcinates on it after screen-stenciling an insulating paste further, an insulating layer is formed in it, and an electrode system is formed [after screen-stenciling carbon paste to a degree] in it after screen-stenciling a silver paste. Subsequently, a notch is pierced and it dissociates. The obtained sheet carries out opening of the notch, and is shared at the insulating substrate of both upper and lower sides. And on the sheet used as the substrate of one side, it dries after screen-stenciling the mixed ink of glucose oxidase and a ferrocene carboxylic acid to the electrode section, and a reaction layer is formed. Subsequently, as shown in each of the sheet which serves as an operation pole in the sheet and reaction layer of another side used as a counter electrode at drawing 4, the ink which consists of a heat activity heat-curing mold binder is screen-stenciled, it dries, and a spacer is formed (in addition, it can collect into either, and a spacer can also be formed and manufactured). Subsequently, both sheets are piled up, and a laminating is pasted up and carried out with a spacer with heat and pressure, and after immobilization, it pierces and considers as a final sensor configuration.

[0023]

[Effect of the Invention] According to this invention, a biosensor can be easily measured by a small amount of sample, and it is easy to use, and can do with a thing cheap disposer pull type. If the same configuration of the pattern of electrode systems, such as an appearance configuration of two insulating substrates and a lead, is carried out, a production process can be communalized with both substrates, and even if it prepares an electrode system in each of both substrates, it can do with a cheap sensor. Moreover, the spacer, then spacer sheet of printing or partial spreading are unnecessary in a spacer, the number of component parts can be reduced, and it is made to a cheap sensor. Moreover, according to the manufacture approach of this invention, the above-mentioned biosensor can be manufactured efficiently. Manufacture of the insulating substrate of both upper and lower sides can be communalized to the middle by the same configuration-ization of an appearance configuration and an electrode system pattern, the common printing version and a common cutting die can be used, and the cost reduction effectiveness is acquired. Furthermore, if the notch for connection terminal exposure is cut by half cutting, and it breaks up while the dust of a notch manufactures, ** can be prevented and manufacture will become easy.

[Brief Description of the Drawings]

[Drawing 1] The decomposition perspective view showing the structure of one example of the biosensor of this invention.

[Drawing 2] The external view of the biosensor of this invention of drawing 1.

[Drawing 3] The sectional view in the A-A line (drawing 2) of the biosensor of this invention of drawing 1.

[Drawing 4] The process explanatory view which assumed multiple attachment as one gestalt of the manufacture approach of the biosensor of this invention. (a) Cut deeply on the boundary of the insulating substrate whose perimeter is not cut into a sensor configuration, (b) lead formation, (c) electrode formation, (d) insulation stratification, (e) reaction stratification, spacer (1 f- 2) formation, and a notch (1 g- 2), and it is punching to a sensor configuration about the perimeter a laminating and after pasting up in formation and (h) vertical substrate.

[Drawing 5] The explanatory view of the notch at the time of performing the manufacture approach of the biosensor of this invention by multiple attachment.

[Drawing 6] The decomposition perspective view showing an example of the structure of the conventional biosensor.

[Drawing 7] The external view of the conventional biosensor of drawing 6.

[Drawing 8] The sectional view in the A-A line (drawing 7) of the conventional biosensor of drawing 6.

[Description of Notations]

1, 1a, 1b Insulating substrate

11a, 11b Notch

12 Boundary Line of Notch and Insulating Substrate Body

13 Punching Configuration at Time of Considering as Appearance Configuration of Sensor

21 Lead

22 Electrode

221 Operation Pole

222 Counter Electrode

23 Connection Terminal

3 Reaction Layer

4 Spacer

5 Insulating Layer

6 Space Section

61 Inlet

62 Exhaust Port

10 Biosensor

91a Sheet (substrate)

91b Sheet (cover sheet)

921 Lead

922,922a Electrode

923 Connection Terminal

94 Insulating Layer

95 Reaction Layer

96 Space Section

97 Spacer Sheet

98 Inlet

99 Exhaust Port